Claims

1. Load-bearing means (11) for a transport system, in particular for a shelf-stacking device (1), with a telescopic table (15) displaceable in a plane parallel with a support surface (6) for accommodating at least one storage aid (4), e.g. container, box, etc., with a bottom table (16) and with an intermediate table (17) and top table (18) displaceable relative thereto and relative to one another in linear guide systems (42, 43, 44, 45) disposed preferably symmetrically by reference to a mid-plane (46), and with a drive system (66) between the bottom table (16) and intermediate table (17) and a transmission system (68) for displacing the top table (18) depending on the relative movement between the bottom table (16) and the intermediate table (17), wherein the guide systems (42, 43, 44, 45) are disposed between the intermediate table (17) and the bottom table (16) and between the intermediate table (17) and the top table (18) in guide planes (47, 48) spaced apart from one another and extending parallel with a bearing surface (26) of the top table (18), and at least one other guide system (79, 80) forms a guide plane (78) oriented perpendicular thereto and parallel with a displacement direction of the top table (18), and the transmission system (68) incorporating transmission means (70) is disposed in a transmission plane (76) extending at an angle (77) with respect to a top face (62) of the top table (18) and parallel with the displacement direction.

2. Load-bearing means according to claim 1, wherein the bottom table (16) and/or the intermediate table (17) and/or the top table (18) is or are preferably made from fiber and/or fabric reinforced plastic.

3. Load-bearing means according to claim 1 or 2, wherein the bottom table (16) and/or intermediate table (17) and/or top table (18) is or are made from light metal alloys, in particular from magnesium alloy.

4. Load-bearing means according to one of the preceding claims, wherein the intermediate table (17) and/or the top table (18) is a carbon fiber reinforced composite component.

5. Load-bearing means according to one of the preceding claims, wherein the intermediate table (17) and/or the top table (18) is a Kevlar fiber reinforced composite component.

6. Load-bearing means according to one of the preceding claims, wherein the composite material of the intermediate table (17) and/or the top table (18) is made from plastic, in particular from polyester resins.

7. Load-bearing means according to one of the preceding claims, wherein reinforcing elements of lightweight metal, steel, etc., are provided in the composite material for the intermediate table (17) and/or the top table (18).

8. Load-bearing means according to one of the preceding claims, wherein the guide systems (42, 43, 44, 45, 79, 80) are provided in the form of roller guides.

9. Load-bearing means according to one of the preceding claims, wherein the guide systems (42, 43, 44, 45, 79, 80) are provided in the form of anti-friction bearing guides.

10. Load-bearing means according to one of the preceding claims, wherein the guide systems (42, 43, 44, 45, 79, 80) are provided with friction-reducing and wear-resistant guide elements (55) forming strip-shaped guide projections (53) between recesses (54).

11. Load-bearing means according to one of the preceding claims, wherein the guide element (55) is provided in the form of a U-shaped anti-friction section (56), in particular made from a plastic with good anti-friction properties.

12. Load-bearing means according to one of the preceding claims, wherein a friction-reducing, wear-resistant coating (58), in particular made from plastic with good anti-friction properties, is provided on an external surface of the guide elements (55).

13. Load-bearing means according to one of the preceding claims, wherein U-shaped anti-friction sections (56) are secured to the guide projections (53) by a positive and/or frictional clamping action.

14. Load-bearing means according to one of the preceding claims, wherein the strip-shaped guide projections (53) are disposed in the longitudinal direction with respect to the recess of the guide elements (55) extending on the intermediate table (17) and/or top table

(18) and/or bottom table (16) across an entire length (30) and co-operate with the groove-shaped recesses (54) on the bottom table (16) and/or intermediate table (17) and/or on the top table (18).

15. Load-bearing means according to one of the preceding claims, wherein a cross-section of the intermediate table (17) is of an approximately I-shaped section and the strip-shaped guide projections (53) on the intermediate table (17) form a top band and a bottom band.

16. Load-bearing means according to one of the preceding claims, wherein a top face (62) of the top table (18) extends in a concave design.

17. Load-bearing means according to one of the preceding claims, wherein the guide projections (53) forming the parallel guide planes (47, 48) are disposed on the middle table, preferably symmetrically by reference to a mid-plane (46).

18. Load-bearing means according to one of the preceding claims, wherein a band width (64) of the top band forming the guide systems (42, 43) between the intermediate table (17) and the top table (18) is bigger or shorter than a band width (65) of the bottom band forming the guide systems (44, 45) between the intermediate table (17) and the bottom table (16).

19. Load-bearing means according to one of the preceding claims, wherein groove-shaped recesses (54) are provided in the top face and the bottom face of the intermediate table (17) extending in the direction of longitudinal extension to form the guide systems (79, 80) providing lateral guidance in the other guide plane (78), which preferably extends perpendicular to the guide planes (47, 48) and parallel with the displacement direction.

20. Load-bearing means according to one of the preceding claims, wherein the groove-shaped recesses(54) co-operate with the strip-shaped guide projections (53) disposed on the top table (18) and bottom table (16).

21. Load-bearing means according to one of the preceding claims, wherein the strip-shaped guide projections (53) are provided with the guide elements (55).

22. Load-bearing means according to one of the preceding claims, wherein U-shaped complementary sections (57) are disposed in a positive or frictional connection in the groove-shaped recesses (54) enclosing the guide elements (55), which are preferably made from coated metal or plastic with good anti-friction properties or coated plastic.

23. Load-bearing means according to one of the preceding claims, wherein an angle (77) between the transmission plane (76) and the top face (62) of the top table (18) is between 10 ° and 60 °.

24. Load-bearing means according to one of the preceding claims, wherein locking mechanisms (86) are disposed at opposite end regions (84, 85) of the top table (18), preferably on side walls (59), and have locking means which can be displaced relative to the top face (62) of the top table (18) between a position more or less flush with it and a position projecting beyond it.

25. Load-bearing means according to one of the preceding claims, wherein the locking means is provided in the form of a double lever element (31) with a hook-shaped lock projection (97) on the side wall (59) of the top table (18) mounted so as to be pivotable about a pivot axis (88).

26. Load-bearing means according to one of the preceding claims, wherein the locking means is displaceably connected to a single lever element (89) in a slide block system (96) on the side wall (59) which is pivotable about a pivot axis (87).

27. Load-bearing means according to one of the preceding claims, wherein the single lever element (89) is pivoted on an operating region (94) projecting above the top face (62) of the top table (18) by means of a load force, which causes the double lever element (91) to pivot into a position in which the lock projection (97) projects above the top face (62) of the top table (18).

28. Load-bearing means according to one of the preceding claims, wherein the single lever element (89) is positioned in a non-operating position by means of a spring system (92), preferably a leaf spring, in which the operating region (94) projects above the top

face (62) of the top table (18) positioned against a stop means (93).

29. Load-bearing means according to one of the preceding claims, wherein the locking means is designed to be displaceable between the non-operating position and an operating position in which it projects above the top face (62) of the top table (18).

30. Load-bearing means according to one of the preceding claims, wherein a projection distance, e. g. a hook height (98), of a catch pawl (90) forming the locking means is preferably bigger than or the same as a vertical distance (100) between support surfaces (101) of the endless conveyors (31, 32) and the bearing surface (26) of the top table (18).

31. Load-bearing means according to one of the preceding claims, wherein the drive system (66) is provided in the form of an electric motor-driven traction drive (67), e.g. chain drive, cable drive, belt drive, etc., disposed between the bottom table (16) and the intermediate table (17) .

32. Load-bearing means according to one of the preceding claims, wherein the drive system (66) is provided in the form of an electric motor-driven spindle drive between the bottom table (16) and the intermediate table (17).

33. Load-bearing means according to one of the preceding claims, wherein the drive system (66) is provided in the form of a gear/rack and pinion drive.

34. Load-bearing means according to one of the preceding claims, wherein the traction drive (67) is provided in the form of a multiple chain, preferably a triplex chain, and at least one chain strand meshes with a toothed rack (83) secured to the bottom face (81) of the intermediate table (17).

35. Load-bearing means according to one of the preceding claims, wherein the transmission system (68) has strand-type transmission means (70) guided by sprocket wheel means (69) rotatably mounted at opposite end regions of the middle table.

36. Load-bearing means according to one of the preceding claims, wherein the transmis-

sion system (68) is provided in the form of a gear/ rack and pinion drive.

37. Load-bearing means according to one of the preceding claims, wherein bearing sections (21) of the shelves (3) have inlet ramps with angled side webs for the storage aids (4) at their end region facing the shelving aisle, and a positioning point (103) for a position detection unit (106) disposed on the load-bearing means (11) and connected to a control unit of the shelf-stacking device (1) so as to communicate with it is disposed in a plane extending perpendicular to the displacement direction of the telescopic table.

38. Load-bearing means according to one of the preceding claims, wherein the position detecting system is preferably provided in the form of an optical electronic detection unit.

39. Load-bearing means according to one of the preceding claims, wherein the detection system comprises at least two sensors, preferably light sensors (107), disposed at a distance apart from one another in the height direction by approximately a height (104) of the positioning point (103).

40. Method of operating a transport system, in particular a shelf-stacking device with a load-bearing means with a telescopic table for stowing and retrieving storage aids in and from a shelving system, and for accommodating or transferring the storage aids from an incoming conveyor system or to an outgoing conveyor system, and with a control unit for the shelf-stacking device provided with a computer for positioning the load-bearing means in an X and Y axis and for extracting the telescopic table in a Z axis, wherein, in a first motion sequence for approaching a predefined position with the load-bearing means (11), a computer-controlled drive system of the shelf-stacking device (1) designed to effect a displacement in the X axis and simultaneously a drive system designed to effect a displacement of the load-bearing means (11) in the Y axis are supplied with energy and the load-bearing means (11) thus displaced into a predefined desired position in order to pick up and/or transfer at least one storage aid (4) from the incoming conveyor system (22) or onto the outgoing conveyor system (24) or to a drive-in cross-section between storage aids (4) stowed in the shelf (3) and, once the desired position is reached, the drive systems of the shelf-stacking device (1), in particular the drive system for effecting the vertical displacement of the load-bearing means (11), is supplied with energy in response to a position de-

tecting unit (106) disposed on the load-bearing means (11), preferably optical electronic sensor system, using a reference means defining the actual position, computer-controlled by a control unit (110) of the load-bearing means (11) in order to move it from the desired position into the actual position.

41. Method according to claim 40, wherein, in order to detect a variance between the desired position and the actual position, the reference means defining the actual position, for example the positioning point (103), is scanned by means of light beams (114) of at least one light sensor (107) of the optical electronic position detecting unit (106), and detection signals of the position detecting unit (106) are compared with an actual state and a desired state in a signal matrix stored in a computer (111), and variances between the desired state and the ACTUAL state are compensated by activating the relevant drive systems of the shelf-stacking device (1) and/or the load-bearing means (11) on the basis of a catalogue of actions stored in an automatic control circuit.